

Virginia Western Community College

BIO 162 - Introduction to Ecological Systems

Prerequisites

BIO 101 highly recommended

Course Description

The goal of this course is to introduce the student to the field of environmental toxicology and apply its principles to environmental issues. The course includes defining the principles and methods of toxicity testing, biological monitoring, risk assessment, health risk, and impacts of toxins to air and water quality. Different classes of environmental chemicals and links to ecotoxicology effects on wildlife, human exposures, and environmental epidemiology will be explored. The course will include case studies in Virginia.

Semester Credits: 3

Lecture Hours: 3

Laboratory/Recitation Hours: 0

Required Materials

- Textbook: Essentials of Environmental Health, 3rd Edition. Robert H. Friis, PhD. ISBN: 9781284123975
- A personal computer or reliable access to a computer or tablet for access to Canvas for videos and assignments.
- Access to reliable, high speed internet service. All students are also expected to have access to appropriate computer and wifi resources. Please see the VWCC Computer expectations for students: https://www.viriniawestern.edu/online/computer_expectations_for_students.php
- Canvas assignments/readings including chapters from *Silent Spring*

Course Learning Outcomes

Upon completion of this course, students will be able to:

- Describe the scientific method and how it's used
- Define Environmental Toxicology
- Identify the categories of man-made and naturally occurring chemicals in the environment and list at least three ways that they impact human health and the environment
- Apply the principles of chemical absorption, distribution, metabolism and excretion (ADME) in humans and animals to risk assessment and the transport of chemicals in the environment
- Compare and contrast exposure routes, bioaccumulation, bioassessment, and risk factors
- Relate exposure risk and potential impacts to the cell cycle and human health
- List at least four roles that chemicals play in our lives and show potential exposure impacts to consumers
- Identify everyday products/services that may contain potentially harmful chemicals
- Read a product information label found on consumer goods, including foods, pesticides, and household products and be able to identify potentially toxic product ingredients
- Apply the knowledge obtained from this course to evaluating exposure and solving problems associated with environmental contaminants
- Use a case study to assess risk assessments of the environment, analyze data and evaluate health impacts from exposure to contamination
- List the major regulatory agencies and laws that protect consumers from toxins
- Apply contemporary environmental issues and the impact of environmental toxicology to sustainability in a global and societal context
- Identify the skills, techniques and tools necessary for a successful career in the field of environmental toxicology.

ENV 162 Tentative Course Schedule

Week	Lecture Topic	Readings
1	Introduction to class Discussion of syllabus, coursework, introductions, interests and career goals and options in toxicology. General overview of environmental toxicology applications and relevance and the scope of the course	Ch 1
2	History of Ecotoxicology, Role in Environmental Health, Sustainability, case studies, Intro to epidemiology	Ch 1– 3
3	Discussion of the fundamentals of toxicology and role of the environment and chemical exposures in health. Toxicology and epidemiology; Definition of toxins and mechanisms	Ch 3, 6
4	Putting measurements on toxic outputs, toxin pathways, exposure routes. Review general terminology	Ch 6
5	Basics of Dose-response curves, factors contributing to response in humans and ecological systems. Discussion of different types of chemical and concentration-dependent responses and interpreting dose-response data	Ch 3, 7
6	ADME: Continuation of how to define the toxicity of a chemical and dose-response applications. We will explore the factors that influence a chemical's disposition in human health and sensitive species, focusing on uptake and elimination.	Ch 3, 6
7	Chemical effects on biochemical and molecular pathways and the interaction of chemicals with the major classes of biomolecules	Ch 7, 8
8	Applying ADME principles; relating factors to health; Introduction to measuring rates of exposure and response	Ch 9
9	Measuring exposure rates; Testing toxicity; Impacts to health; air and water quality	Ch 4, 9, 10
10	Introduction to risk assessment: defining, quantifying, role in environmental toxicity and health regulation	Ch 4, 9, 10
11	Risk and exposure: mitigation, regulation, environment, case studies	Ch 4, 10, 11
12	Review of the physical and chemical processes that influence how a chemical moves in the environment; Review of different strategies for determining toxicity of a chemical and how biomonitoring is used to evaluate environmental health in situ.	Ch 2, 4, 6
13	Introduction to heavy metals and organic chemicals: risk and exposure routes in human health and sensitive species	Ch 7
14	Developmental origins of disease and endocrine disruption; biomarkers in ecological and human health risk assessment	Ch 11,12,13
15	Carcinogenic effects: chemicals and genotoxicity pollutants and their effects in the environment	Ch 12,13
16	FINAL EXAM	

Note to Instructors

1. Departmental policy dictates that instructors do not allow students to keep tests.
2. A comprehensive final project counting 15%-20% of the total grade will be given near the end of the semester.
3. The syllabus should state what the course grade will be based on, such as tests, quizzes, a comprehensive final exam, and any other assignments made by the instructor.
4. The VWCC Biology Department uses a 10-point grading scale.